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## 1. Introduction

When the Kaiser Foundation released its report on electronic media use among infants, toddlers, and older preschoolers (Rideout, Vandewater, & Wartella, 2003), commentators, older adults, and parents of older children were shocked and amazed. Only the parents of very young children and those who work daily among them were unfazed. The study of 1,000 parents of children from 6 months to 6 years of age revealed a young generation surrounded by media devices and immersed from birth in electronic media content.

The report's summary of media immersion:

> Nearly all children (99%) live in a home with a TV set, half (50%) have three or more TVs, and one-third (36%) have a TV set in their bedroom. Nearly three out of four (73%) have a computer at home, and about half (49%) have a video game player. In some ways, new media is trumping old: nearly twice as many children in this age group live in a home with Internet access (63%) as with a newspaper subscription (34%). Nearly all of them (97%) have products—clothes, toys, and the like—based on characters from TV shows or movies. (p. 4)

More astonishing than immersion is the usage: "nearly half (48%) of all children 6 and under have used a computer, and more than one in four (30%) have played video games" (p. 4). Even more distressing to some is the constant presence of TV content:

> Two-thirds of 0- to 6-year-olds (65%) live in a home where the TV is on at least half the time or more, even if no one is watching, and one-third (36%) live in "heavy" TV households, where the television is left on "always" or "most of the time." Just under half (45%) of all parents say that if they have something important to do, it is very or somewhat likely that they will use TV to occupy their child while they finish their task. (p. 4)

The study elaborates the usage of each form of electronic media and breaks the data down into smaller age groups. Not surprisingly, usage rises sharply with age, but media is part of the lives of even 6-month-olds. "In a typical day, 68% of all children under 2 use screen media (59% watch TV, 42% watch a video or DVD, 5% use a computer, and 3% play video games), and these youngsters will spend an average of two hours and five minutes in front of the screen" (p. 5).

According to parent responses to the survey, "two out of three (65%) children ages 0 to 6 read or are read to every day (another 29% are read to a few times a week). In a typical day, 79% of all children in this age group spend time with books . . ." (p. 6). Other findings:

- Listening to music is one of the most popular activities
- Videos and DVDs are a staple in the lives of preschoolers
- Few differences emerged between media patterns of boys and girls
- Most very young children use media with someone else, generally a parent.

Among parents surveyed, 7 in 10 (72%) believe computer use and television viewing are educational.

Of particular interest in this report on research is the relationship between media and preschool children, that is, children 4 years of age and younger, but especially those between birth and 3 years of age. Professor Daniel Anderson, a psychologist at the University of Massachusetts in Amherst, has generated cutting edge research for nearly 25 years on how very young children view media, use media, and are affected by media. He is among a small coterie who began in the 1980s to bridge the chasm between developmental neurologists and psychologists who studied fetal life, neonates, and infants on the one side, and media scholars who studied the impact of media on school age children and those who watched *Sesame Street* on the other. Anderson's former doctoral students have built research agendas of their own, which over the last decade began intertwining, particularly at the

University of Texas, with mass communication oriented scholars like Ellen Wartella, Aletha Huston, and the late John C. Wright.

One of the most amazing areas of growth in research methods and findings lies in the earliest part of human growth and development, *in utero* and newborn stages. As Karmiloff and Karmiloff-Smith (2001) observed:

> Over the last two decades, novel infancy research techniques have been developed that shed light on these much earlier stages of language learning. Along with a new understanding of fetal and neonatal speech processing, the importance of early mother-infant nonlinguistic dialogue has been recognized." (p. 3)

One of those novel techniques, the authors reported, was insertion of tiny microphones "outside the wall of the uterus" to measure the noises that enter the womb and ultrasound recordings of fetal activity. The results: from 20 weeks of gestation, when the hearing system is developed, "The fetus' world is filled with a cacophony of gurgles and grumbles. . . . But most stimulating of all are the filtered sounds of language" (p. 1). That a fetus recognizes its mother's voice *in utero* and upon delivery is but one new line of research in this rapidly expanding field. Of interest to media scholars is the degree to which media sounds—and their impact on a mother's nervous system—occur *in utero* and from that moment forward through preschool years.

Central to these issues are profound theoretical questions from the classic nurture vs. nature to the process by which the youngest humans adapt to a media world or, conversely, the impact the media world has on the adaptation of infants, toddlers, and very young children. This first generation of research into this area is providing patterns of relationship, but the directionality of causation, if there is such, is coming more slowly. For example, studies cited later point to a relationship between viewed violent content among 3-year-olds and more aggressive behavior in subsequent play in comparison to the play style of those who watched *Mr. Rogers.*

Children, especially very young children, provide an ideal group for assessing the accuracy of Marshall McLuhan's (1964) characterization of media as the "extensions of man," both as newcomers to the media society from widely divergent media environments and as individuals whose growth and development in one way or another incorporate and adapt to modern media. Nor is concern about children and their media unique to the modern era. The arrival of dime novels, cinema, and comic books spawned public discussion about the possible negative effects on youth, especially boys. And, children's magazines originated in the early 1800s as a vehicle for communicating religious values through Sunday schools. Soon after television became a form of home entertainment for the majority of households in England, Himmelweit, Oppenheim, and Vince (1958) searched out a village not yet reached by this new medium in order to monitor the effects on children which accompanied its introduction. In the United States Schramm (1961) and his colleagues studied its impact on learning and development among school children.

Preschool children, however, were largely an afterthought for both television programmers and researchers, at least until Joan Ganz Cooney founded Children's Television Workshop (CTW) in 1967 as a producer of TV programs with specific educational goals and objectives for 3–5 year olds. As Cooney (2001) points out, research was the first step and the last step in CTW's production cycle. "The notion of combining research with television production was absolutely heretical in 1967 when we began making plans for Children's Television Workshop" (p. xi).

CTW's goals were clear and simple: "to use television to help children learn, particularly children in low-income families." As the lone pioneer in researching preschool children and television, CTW opened the door in design, methodology, and theory for very young children. Moreover, CTW developed two distinct research streams. Formative research tested every aspect of every program segment with groups of children to identify the most effective television strategy. Summative research employed various settings, groups, and methods for measuring learning gain against the goals of specific segments (Fisch & Truglio, 2001, pp. 7-9).

The international success of *Sesame Street* demonstrated to supporters and naysayers alike that substantive research on pre-school children was not only possible, but yielded results rich enough to shape television production and to analyze the learning gains from each segment across a wide variety of children and settings. The vast majority of research, however, continued to focus on older children, apart from some advertising research (Ward, Wackman, & Wartella, 1975; Wartella, 1979; Levin, Petro, & Petrella, 1982). As the body of research developed through the 1980s, pioneer researchers in several fields, but especially neuropsychology and cognitive development, began

studying younger and younger children, eventually moving to those *in utero* (Eliot 1999).

According to the calendar of media technology, however, the 1970s are an era not so distant as the 19th century, but far removed from the children's media environment of the early 21st century. CTW research began in an era dominated by three major TV networks, an age before home computers and widespread cable systems, a time when music was sold on records or tapes, a time before VHS recorders, and one where children's books and toys were but remotely related, if at all, to what they heard on radio or saw on television. The research reviewed in this essay covers various forms of media which employ a range of content designed for various purposes with children whose age ranges from a few months *in utero* to age 5, the normal start of kindergarten. The research also incorporates viewing conditions which range from isolated use in the child's bedroom through family settings to day care and other group situations.

With so many variables at play, the historical overview of Wartella and Reeves (1985) provides several key categories: "issues of physical and emotional harm, and changes in children's knowledge, attitudes, and behaviors." Within each age group and medium category, the research will be organized under five topics: physical impact, emotional impact, knowledge, attitudes, and behaviors. With the older groups, findings on the perennial concerns of advertising and violence will be added. Because a number of more recent studies manipulate variables such as the setting, parent vs. video presentation, and computer interaction, these will be treated as subcategories.

Chaffee, McLeod, and Atkin (1971) looked to a child's family environment for keys into learned media behavior. Their research addressed older children with an eye toward political information processing, but their underlying schema carries value in reflecting on very young children, as the Early Window project demonstrated (Huston, Wright, Marquis, & Green, 1999; Wright, Huston, Murphy, St. Peters, Piñon, Scantlin, & Kotler, 2001; Wright, Huston, Scantlin, & Kotler, 2001). How parents view and use media, coupled with their conversational style with children, shape not only lifelong language ability, but other characteristics as well. And, in households where children learned a disciplined use of television, similar long term consequences were identified

What follows in the several sections devoted to specific media forms—print, audio, television, and video/computer games—is far from an exhaustive review of the literature in each area and for each medium, although it does cover the major trends and principal researchers, especially for very young children.

## 2. Print Media

Print materials, which include books, magazines, pictures, and photos, are on one level simple contents to which infants and young children can be exposed. On another, more complex level, they are the content which parents, grandparents, older siblings, and others read or explain. This latter phenomenon, reading or explaining print material, comprises a set of interactions which have social, psychological, cognitive, and entertainment dimensions. Research on newborns, infants, and toddlers expanded dramatically in the 1980s as neuropsychologists, linguists, developmental psychologists, and pediatric specialists began to create new methods for testing infant subjects and to take advantage of new medical technologies in exploring the mental processes of their tiny subjects. Underneath this exploration of the frontier was a recognition that newborns arrive not with a *tabula rasa*, but with a working memory, developed hearing, and the ability to recognize familiar sounds.

One of the more fascinating discoveries came from DeCasper and Fifer's (1980) study of 16 pregnant women who read a Dr. Seuss story to their *in utero* infants every day beginning 6½ weeks before the due date. Once born, the infants were given a nipple which, through their sucking, controlled the sounds played to them. Newborns quickly adjusted their sucking speed to get their mother's voice reading *The Cat In The Hat* or *To Think That I Saw It On Mulberry Street*, whichever the mother had read to them. They also adjusted their sucking speed to hear music which played while they were *in utero*.

In a follow-up experiment, DeCasper and Fifer followed the same maternal reading exposure *in utero*, but gave newborns a choice of the voice of their moth-

er or that of another woman reading the story. Newborns overwhelmingly preferred their mother's voice. Kisilevsky, Silvia, and Hains (2003), who had proved that fetuses hear by the third trimester of pregnancy (Kisilevsky, Muil, & Low, 2000), found that *in utero* infant heart rates accelerated when an audiotape of their mother's voice reading a poem was played. When a stranger's voice read the same poem, the heart rate declined. *New York Times* writer Gina Kolata (1984) summarized a wide range of research in the U.S. and in France as pointing to neonates as having exceptional abilities. Lipsitt (1998) observed that while the research is exciting, with "certain kinds of learning, it is not absurd to suggest that the very young child may never again in its life be as fast at learning as during the newborn period and the succeeding few months." But he also cautioned that the learning curve flattens out as social and environmental factors become part of the learning process.

Whatever the precise rate of learning among newborns and infants, DeCasper and Fifer's basic finding held up in subsequent replications: newborns who are read to *in utero* will actively seek their mother's voice reading the same story. The extent to which the mother's voice and the unique sound of a familiar reading interact remains to be sorted out. Research has consistently shown that a newborn will instinctively turn in the direction of its mother's voice, an effect that is more pronounced when the mother read books and poems regularly during the final prenatal weeks (Lipsitt, 1998).

The role of print media as a social process begins with *in utero* reading and extends through the newborn, toddler, and young childhood stages. Print media alone, i.e., separated from social interaction, can operate much like audio media, which will be discussed in the next section. Child use of either medium in isolation has far less impact than one or the other used as part of interaction with parents, siblings, or others, as will be seen. Print media include books, magazines, photos and pictures that can be viewed, though probably not fully understood, independently. But, when a parent or other adult holds a child and reads aloud, several powerful and separate sensory components in the developmental world of infants, toddlers, and young children become part of the context:

- The warm touch of being held
- The scent of mom or dad or another familiar person
- The sound of a familiar voice
- The sight of images, letters, colors.

Being held is a crucial component in early bonding between infants and other members of the family, particularly the adults (Greenspan & Lewis, 2000). Sitting on a lap or nestled in someone's arms furthers the bonding process as an additive value to being read to. Scent is often underrated or ignored as a factor in bonding, but infants know their mothers by scent from the moment of birth (Varendi et al., 1994; Makin & Porter, 1989) and if held, learn the scent of other family members (Porter & Moore, 1981). The familiar sound of the mother's voice or of a voice that becomes familiar in early childhood contribute to the overall pleasure, comfort, and security that accompanies being read to (Eliot, 1999, p. 389).

When Jim Trelease (1979, pp. 14–15), a pioneering activist in the reading movement, encouraged a father to begin reading aloud to a 6-month old, the father demurred, "she won't understand the words I'm reading to her." Trelease reminded him that if the child is old enough to talk to, it is old enough to read to. The act of reading a book or poem aloud or of explaining a picture or photo constitutes a more complex model of learning. Trelease based his approach on Deutsch's (1963) study of the learning deficits suffered by children who are neither read to nor engaged in conversation by parents and other adults in the preschool years.

Subsequent research on language acquisition and development underlines the value of Trelease's reading campaign: "Books are without doubt the most effective tool for teaching language" (Eliot, 2000, p. 390). Beginning to hear reading aloud in infancy yields greater language skills in two-year olds than among comparison groups who were not read to (Dunn et al., 1977; Whitehurst, Falco, & Lonigan, 1988; and DeBayrshe, 1993). While straightforward reading aloud has multiple benefits, a dialogic form of reading further encourages the development of a child's communication skills. Prompting a young child to interact with the story by adding details, raising questions, and commenting on characters or setting or action, may increase language skills among 2-year olds by as much as nine months above the standard level. Durkin (1966) found four factors constant among 79 children identified by teachers as "early readers":

- The child is read to regularly.
- A wide variety of printed material is available in the home.
- Paper and pencils are readily available in the home for scribbling and drawing.

- Parents and others in the child's home praised reading, answered questions, and generally supported reading through their actions.

The darker side of this situation is that 88% of children who have reading problems in first grade will still have them in fourth grade, and those who have them in fourth grade will, without major intervention, steadily fall behind as they progress through higher level schooling which depends increasingly on reading ability (Whitehurst & Lonigan, 2001).

Trelease distinguished between the pleasures of reading, which include learning stories, and the language skills required for self reading. The former, he argued, are appropriate for reading aloud to very young children; the latter are the subject of formal education. Being read to lays the foundation for a significant communication process: the structure and trajectory of a story. Reading aloud provides preschool children with both enriched vocabulary and the ability to tell a story (Golinkoff & Hirsh-Pasek, 2003, pp. 102–03) Two other components, the ability to link sounds with letters and a grasp of how letters combine to make words begin with the level of cognitive development typical of 4- and 5-year olds, and these remain a central task of 4-year-old and 5-year-old kindergarten youngsters.

One of the interesting phenomena observed among toddlers who cannot read is that they will pretend to read a favorite story but with a high degree of accuracy, while holding the book upside down. Development scholars speculate that this pattern generates the pleasure of being read to and replays memorized enjoyment. Some mothers report toddlers want to return the favor of being read to by "reading" the book to an adult . . . perhaps adding elements from other stories.

While a rich vocabulary is an obvious benefit from being read to, the ability to tell a story is an equally crucial foundation stone for language development (Engel, 1999). In hearing the narrative structure of many different stories, children also learn models for assembling their own experiences and ideas into a narrative. Moreover, as they hear many different kinds of stories—long and short, adventures and descriptions, fanciful and factual—children build up a repository from which they can draw the structure which seems best suited to showing off birthday presents or recounting a trip to the zoo.

Paucity of both vocabulary and storytelling models handicaps children who are read to seldom or not at all, so that when they enter kindergarten and begin to study letter sounds and spelling, they enter the unfamiliar world of books and stories. Among the sharpest criticisms of television viewing by children under two years of age were raised first by Trelease and repeated by almost every researcher who has examined language development. When television viewing displaces reading aloud to children, particularly in the first four years of childhood, language development deteriorates proportionately. When television viewing replaces being read to among preschool children, particularly in low socio-economic status households, overall learning declines, and the consequences can reach into academic performance in high school (Neuman, 2003; Golinkoff & Hirsh-Pasek, 2003).

Ascribing lower language abilities and less frequent reading among older children and teens to television viewing remains, nonetheless, a highly controversial conclusion. Leading media scholars, as will be discussed in the television and video section, point to controlled and careful studies which find television viewing time may have some initial impact, but in the longer run is not related to academic achievement or learning or language development.

When children reach kindergarten age, they continue to have difficulty separating letter sounds in words. Indeed, teaching letter sounds and the spelling of three- and four-letter words remains one of the major tasks of K4 and Kindergarten classes because it is only in that age range that children's cognitive development allows them to move forward.

Eyesight is the weakest of the newborn's senses, and it has been compared to looking through a fog or a piece of frosted glass (Eliot, 1999). In addition to a very short focal range, newborns can discern only bold contrasts, bright colors, and strong patterns. Recognition of its mother's face comes within hours after birth, however (Walton, Bower, & Bower, 1992). Using the wired pacifier method, they found newborns sucked at a rate which projected their mother's face on the screen for a sustained period. Perception of color and depth develop over the first six to nine months, and a wide variety of toys from mobiles and colored rings to soft books with bright colored images are marketed to guarantee maximum development. Placing photos of faces cut from a magazine provides significant visual stimulation, as do geometric black and white images.

Once the infant gains full control of neck muscles, a simple picture book—especially one treated as a read aloud book—moves stimulation to the next step. In the toddler stage, children begin to self select

images which please them. But competition from other media has already intensified. Despite the American Academy of Pediatrics' warning that any television is inappropriate for children under two, Rideout, Vandewater, and Wartella (2003) found that 74% of children under two watch television, 43% watch every day, and 26% have a television in their room. Television's combination of images, colors, and motion combine with sound to offer a more complete and stimulating media experience. From the 1970s, *Sesame Street* research demonstrated that print media could be designed for specific educational goals and integrated with an educational television program with significant learning gains over television viewing alone (Lesser & Cooney, 1974). The gains from print materials—storybooks and coloring books—was even more significant when parents read aloud and interacted with children.

The success of this integrated media package for learning gain set the pattern for children's television content which followed, as will be discussed in the television and video section. From a marketing standpoint, they are following a trail blazed by Walt Disney in the 1930s for entertainment purposes.

## 3. Audio

Audio media include music and speech delivered through both traditional electronic devices such as radio, television, and music systems as well as computers and the newer generation of toys with microchips and vocal modification capability. The growth of commercial products designed to entertain, enrich, and educate the very youngest children bear special attention.

Eliot's review of the literature shows that "children's early experience with speech and music are tremendously important in shaping many higher aspects of brain function" (2000, p. 229).

Newborns arrive with hearing ability more highly developed than any other sense, in part, because it began to function four months *in utero* as noted above. While the ability to hear is well under development at birth, it continues to develop through early childhood (Peck, 1995). Through this developmental stage, particularly in the first three years, hearing remains quite plastic, shaped in response to the surrounding environment, including media (Northern & Downs, 2002, p. v).

Hearing directly affects the development of language and communication, and through music it provides a source of pleasure and entertainment. Indeed, children born deaf, like those born to mute parents, require early intervention to prevent serious, lifelong, irremediable limitations in grammar, vocabulary, and pronunciation (Northern & Downs, 2002, pp. 80-81), perhaps because some auditory brain cells are reallocated to other purposes during the great pruning at about age 3 due to inadequate stimulation. Joan Ganz Cooney was working with precisely this group of pre-school children in rural Georgia in the 1960s when she discovered a 3-year old who had learned rudimentary spelling from watching television commercials and was inspired to create pre-school educational television which became *Sesame Street* (Lesser & Cooney, 1974).

The role of audio media among preschool children varies by age group in availability and usage in two major domains: home life and day care. But of particular concern are the audio media which promise to enrich a child's development or teach a new language.

### *A. Newborn to 18 months*

Newborns arrive with a preference for their mother's language as Mehler and colleagues (1988) discovered among 2-day olds in an experiment monitoring sucking patterns on a pacifier. At the same time, newborns seem sensitive to every phoneme in human speech, but by 6 months of age they focus increasingly on sounds of the language(s) spoken around them and become less sensitive to phonemes from other languages (Kuhl 1993, 1994, 1996; Werker & Tees 1983, 1984a, 1984b). This early selectivity explains the persistence of local dialect and pronunciation despite the presence of alternatives in mass media. Throughout childhood sensitivity to phonemes of new languages seems recoverable along with the ability to reproduce the sounds of a new language without accent, but this ability begins to decline as adolescence approaches (Mehler & Christophe, 1995).

Extensive research into language acquisition among infants raises the issue of whether infants can acquire foreign languages by listening to audio material. Some commercial products promise to teach a for-

eign language to newborns. However, daily conversation most powerfully shapes language acquisition rather than simply listening to recorded foreign language (Golinkoff & Hirsh-Pasek, 1988, 2003). The key difference in conversation seems to lie in the social interaction that is part of the drive to communicate. Thus, social interaction between an infant and older person who speaks another language will also shape language acquisition. By 10 months of age, an infant uses adult responses to babbling and general language to sharpen the ability to hear and reproduce the sounds of adult language. Kuhl and Meltzoff (1996) demonstrated that infants will reshape their vowel sounds when an adult repeated the sound as a form of training. Again, the interaction with an adult seemed an important, perhaps crucial element.

Music, on the other hand, seems to evoke immediate positive responses in several forms: quieting, entertaining, and pleasure seeking, but it can also cause discomfort and upset. Volume seems to be an upsetting element for newborns who prefer a softer, lower volume than their older siblings or parents, i.e., sound levels closer to those heard *in utero* (Aslin et al., 1983). Music played regularly while a child is *in utero* can instantly quiet a newborn. As infants mature, specific songs become favorite elements in the child's environment.

Whether specific forms of music could increase a child's intelligence by stimulating the brain became a major controversy in both neuroscience and the market of children's educational materials. Called the "Mozart Effect" because the initial experiment involved that composer's music, this approach argued that the inherent order and logic of Mozart's music increased the intellectual ability of those who listened to it. Rauscher, Shaw, and Ky (1993, 1995) reported increased improvement on a spatial reasoning task after 10–15 minutes of listening to Mozart's music. Campbell (1997, 1998, 2000), inspired by Rauscher, launched a series of music CDs and eventually a book that asserted that regularly listening to classical music stimulates brain development, coordination, and visual tracking among newborns, infants, and young children. Other commercial products followed with similar promises. The problem is that the research is hardly conclusive. Steele, Bass, and Crook (1999) wondered publicly at the inability of other researchers to replicate Rauscher's findings. Hetland (1999, 2000) found the presence of some short-term effect on spatial reasoning, but no evidence that exposure to classical music raises the intellectual ability of children.

As with print media, audio media in this age group can be an important component of child-parent interactions which are so crucial to development, as cited in the introduction. Without interaction, manipulating audio equipment creates a significant barrier in the newborn and early toddler stages. An older sibling, of course, can be a source of audio content.

### *B. 18 months to 4 years*

At a somewhat unpredictable point between 18 months and 2 years of age brain growth leaps forward (Eliot, 2000, p. 373) and language development shifts into high gear as toddlers begin to build vocabulary at an average of eight words per day (Marchman, 1990; Pinker, 1994). It is at this point that pictures, story books, and simple video content can provide new words and associate them with images. This milestone in cognitive development opens the way for all forms of media to play an increasingly significant role in a child's learning, with or without adult interaction, although some adult assistance is required to assist in the operation of equipment in the early stage of this period.

Once this milestone is passed, parental engagement seems to be the single most important factor in a child's vocabulary development—more than media, including language CDs. Hart and Risley (1995), in examining the socioeconomic factors that created significant differences in child development, identified three factors that accounted for most of the difference in language growth: the amount of parental talking to the child, the number of times parents answered children's questions, and the ratio of positive vs. negative feedback. The volume and variety in patterns of parental speech provided models for children in this age group to imitate. The richer the variety, the more examples children heard to draw from and incorporate as their language developed. The positive or negative feedback was of a different order, one supporting the Chaffee, McLeod, and Atkin (1971) findings on differences in family communication patterns. The higher the ratio of positive feedback, the better the language performance of 3-year olds. Children discouraged from asking questions or generally communicating seem to learn that such behaviors are unacceptable. Socialization of children to the patterns and roles of language shapes the child's view.

As digital coordination improves, toddlers can manipulate interactive toys with embedded microchips, and audio devices provide stimulation and play value. Dolls of an earlier generation that cried "Mama,

mama" have been replaced with interactive stuffed toys with embedded microchips and an audio speaker that play a series of short phrases. The more advanced ones have a vocabulary acquisition program that "learns" from what the child says. Nor are these toys designed for girls alone, although dolls aimed at girls remain part of the market.

The BRATZ dolls, Nora and Nita, are an example, as their advertising copy on Amazon.com explains:

> Once they start talking, these twins might not stop. These BRATZ Nita and Nora dolls recognize each other, and then they gab and squabble about it, just like they do in the BRATZ BABYZ DVD movie.
>
> Nita and Nora really talk, and their heads turn as they speak.
>
> Nita and Nora interact with each other by using over 75 phrases.

Aimed at 3-year olds, these dolls generate language and can provide another source for children's vocabulary and grammar style. Note also the modern interdependence or joint marketing of multiple media forms to children at this age. However, as Hart and Risley (1995) have shown, the more powerful effect comes from parental interaction.

It is at this stage that television and computers become more prominent, although music remains an audio form of enjoyment. Media research on this age group shifts heavily to television, as children's coordination allows control of the television set and programs aimed at young children become available.

## 4. Television

No aspect of media research can match the variety and sheer volume of published studies on children and television, reflecting longstanding concern about the impact of the media society on children. From television's earliest years as a source of children's entertainment, parents, scholars, and public officials have worried publicly about its deleterious effects and imagined dire consequences for a generation narcotized by the medium, or, worse, turned into savage killers. As television out-muscled other forms of popular entertainment for the attention of children, public worry turned into serious scholarship which has grown steadily and spread across a wide variety of academic areas from anthropology to theology. Each discipline has brought its own concepts, methodologies, and primary questions as television began to shape popular culture and provided programs which became touchstones for various subgroups of the population.

Similarly, few research areas have pushed so steadily into the frontiers of understanding of children as the scholars examining the growth and development of children from prenatal stages to 3 years of age. New technologies allow us to peer into uterine development, the responses of a fetus, and the brain patterns of infants. Creative new research methods allow researchers to gain glimpses of the patterns of development among infants and toddlers.

The American Academy of Pediatrics (AAP) weighed in on the issue with its assertion that children under 2 years of age should not be exposed to television because of its negative effects (2001). In making its assertion, the AAP relied on a body of research from the scientific community including developmental psychologists, neuropsychologists, linguists, and educational psychologists. Its caution matches that of researchers on infant development. The AAP's recommendation was less warmly greeted by scholars who study school age children and adolescents; their work had made them skeptical of claims about direct effects. The two groups of scholars thus come from significantly different traditions, and they focus on significantly different developmental stages of children, one on neonates and infants through 24 months or so, the other on children from 2–3 years of age through middle childhood to adolescence. Only a handful of researchers have begun to integrate the two with explorations into the relationship between television and children under 3 years of age.

### *A. Neonates, infants, and toddlers (0–18 months)*

Birth initiates a period of dramatic and rapid development of brain cells whose steady response to the infant's environment begin a process of neurological shaping that continues for years. As Eliot wrote:

> genes are important, but anyone who has studied nerve cells can tell you how remarkably plastic they are. The brain itself is literally molded by experience: every sight, sound, and thought leaves an imprint on specific neural circuits, modifying the way future sights, sounds, and thoughts will be registered. Brain hardware is not fixed, but living, dynamic tissue that is constantly updating itself to meet the sensory, motor, emotional, and intellectual demands on hand. (1999, p. 4)

Infancy is the most crucial stage in this molding process: "Although we know from studies of adult learning that the brain remains malleable throughout life, it is massively more so in infancy" (Eliot, 1999, p. 6).

Although infants are born with a somewhat primitive brain, they are not at all Locke's *tabula rasa* (1689); rather, newborns "come into the world with all kinds of mental skills and predispositions, abilities uniquely suited to the critical needs of early life" (Eliot, 1999, p. 6), the ability to recognize their mother's voice, and preference for their native language. Once outside the womb, the skull and brain within it grow very rapidly because of genetic endowment and in response to the demands placed upon it. "While genes program the *sequence* of neural development, at every turn the *quality* of that development is shaped by environmental factors" (p. 9). Television is among the environmental factors, more noticeably present for its sound than its images, which places it with other audio media as a factor shaping the brain development of infants.

The period of rapid proliferation of brain cells in the first eight months is followed by a period of significant cell pruning for efficient operation through age 2, a process which continues as the brain shapes itself through childhood (Eliot, 1999, p. 205). In the first phase of pruning, the brain molds its functions to the specifics of the environment, in some instances with irreversible consequences. In a child born with strabismus, for example, the brain will not develop binocular vision, and if uncorrected will disconnect itself from one eye (Birch, 1993). In a child born blind, the brain will reallocate the 100 million or so neurons from sight to hearing. Such powerful response to environmental stimuli holds true for every aspect of an infant's body. Lacking stimulus from a particular sense or area, the brain will prune away or reallocate the brain cells originally devoted to it. Conversely, the brain will allocate greater resources to areas of high stimulation. From this perspective, the influence of television is part of the overall pattern of stimuli which prompt an infant's brain to shape itself to fit the specifics of the environment.

From the first cry after birth, an infant will begin communicating and learning how to communicate with important people in the immediate environment, especially the mother, who quickly learns to distinguish the meaning of the distinct cries (Haith & Campos, 1983). The communication process and skill with it turns on the relationship between the infant and the parents, older siblings, and other care givers in the immediate environment. Jerome Bruner (1977) understood even the earliest interactions as crucial to developing language and grasping the idea of taking turns in a conversation.

Manning-Morton and Thorp (2001) summarized their observational conclusions about how babies communicate with the following schema:

- Babies communicate their needs and feelings by crying when they are bored, hungry, in pain, frightened, and lonely.
- Babies express their interest and pleasure in communicating with you by gazing, searching with their eyes, smiling, babbling, reaching, craning their necks, pointing, laughing, and shouting.
- Babies show that they want to stop an interaction and their displeasure by looking away, tilting their heads away, grimacing, whining, whimpering, and pushing away with their arms and legs.
- Babies pay more attention to human voices than to other sounds.
- The more others respond to babies' attempts to communicate, the more the babies will continue, and they seem to pause for a response.
- Babies often show that they know what you are about to do by reaching out or looking towards their bib or bottle, for example.

Karmiloff-Smith (1994) integrated these observations about distinct cries, other studies on infant speech efforts, and research about infant response to facial expressions: "It has been demonstrated that young infants can detect the correspondence between auditory speech signals and the visible articulatory movements that accompany them. . . . In other words, they can 'lip read' " (p. 1304). As her research and that of her daughter and other psycholinguists developed, Karmiloff-Smith (Karmiloff & Karmiloff-Smith, 2001) moved somewhat away from the "group of theorists [who] place social interaction at the center of their claims about the processes of language acquisition" (1994, p. 1304). Rather, she argues that recent research

shows that language development not only proceeds on multiple levels at once from early infancy, but that:

> different brain mechanisms will be more attuned to processing one type of input over another. Thus a mechanism that is sensitive to sequential, fast-fading input might pay particular attention to oral or signed language but not to faces, and as it becomes increasingly specialized at processing language, it will become more devoted to that specific domain. (2001, p. 7)

Even more powerfully than Bruner's view that language develops from the earliest interactions, Karmiloff and Karmiloff-Smith's summary of recent psycholinguistic research explains the adamant opposition to exposing infants and very young children to television among those who study the development of very young children. Like other parts of the environment, television provides stimuli which necessarily skew brain development not just in language acquisition but towards understanding television itself. Opposition centers around five major concerns: distortion of brain development, displacement of parental interaction, interference with language development, lack of processing ability, and false promises of enhancement.

The risk television poses for distorting brain development springs from the extraordinary plasticity of brain cells during this period including dramatic growth and subsequent pruning. Within this cycle the brain develops rapidly in direct response to stimuli, and television provides higher levels of visual and aural stimulation than non-TV activities. Healey (2004) points to limited cortical cell growth among television viewers in comparison to non-television viewers owing to the relative passivity of TV viewing in contrast to normal play. But Healey extends findings from studies comparing the cortical development of rats running through challenging maze versus those who live unchallenging lives.

To the extent that television diminishes infant-care giver interactions, it thwarts the normal drive for communicative interaction, and it replaces development of dialogic abilities with one-way communication of uncertain value and direction. In the pre-2 year old age, the communication activities summarized above by Manning-Morton and Thorp require a communication partner. For want of a partner, the opportunity for growth in skill is lost.

Television can interfere with normal language development among infants in several different ways during a crucial period when the ability is developed or lost permanently. Most prominent and damaging is a household where television is constantly on and the volume set high. In addition to overwhelming the infant's auditory sensitivity, this environment makes it extremely difficult, even impossible, for the child to learn the subtle spacing between syllables and words. Because the ability to distinguish phonemes comes in a relatively narrow window from 6 to 18 months (Eimas, 1971) while the infant simultaneously learns the boundaries between words (Christophe, Dupoux, Bertoncini, & Mehler, 1994) and the more subtle sounds of its native language, loud television interferes with language acquisition with permanent results (Kuhl, 1994). Learning to make the sounds of the language develops in companionship with hearing the sounds, because infants can hear their own voices and the phonemes they produce. As this ability develops, an infant begins to associate word sounds with concrete objects and actions in the immediate environment. Learning to name things in the environment follows the ability to hear the original word from a care giver and one's own pronunciation in the context of interaction with someone. A child whose ability to hear is compromised by loud television through most or all of the waking hours in this stage of development will suffer an irrecoverable shortfall in language development. Only if the sound or volume is low enough can the infant distinguish the language of care giver interactions from the background sounds.

Doerkin (1983) found the language of television quite dissimilar from normal parental expression, so full of hyperbole, exaggeration, puns, and words with double meanings as to be unintelligible to an infant learning the language. He was particularly concerned about the odd usages in advertising, including the language of jingles, and argued that such cuteness would replace coherent thought based language.

Television requires a more complex intellectual process than audio or print media, and even 3- and 4-year olds have not yet mastered its intricacies. Developing pictorial competence is a major task of children (DeLoach 1979, 2005; DeLoach, Pierroutsakos, Uttal, Rosengren, & Gottlieb, 1998), who through 24 months seem able to understand pictures right side up or upside down. Yet, distinguishing between pictorial representations and real objects develops slowly to about 19 months of age. Prior to that age, young children will try to grasp or pat objects in photos and on a screen, progressively less aggressively from 15 months on. The inability to process fully

a television image includes failure to understand that television, unlike a window, does not show actual objects and life on the other side.

The original concerns about children and television included the impact of households where television was always on and the way television seemed to fixate children, even very young children, leading to concern about a "narcotizing effect" (Lazarsfeld & Merton, 1948).

The initial explanation for very young children's attention to TV was fascination with the shifting patterns of color, even if they could not process the content. Anderson (1977) characterized fixed attention as attentional inertia which could be affected by distractions in the environment, the program content, and the viewer's pattern. Subsequent research led Anderson (Anderson & Collins, 1988) to elaborate distractability. He discovered that attention to TV begins with color and motion, but even among infants, it continues because of interest in the content, for children look away from the TV set as often as 150 times per hour, disproving the fixed attention construct. Among children 2 years of age and older, content coherence becomes critical, demonstrating a direct link between a child's understanding of content and attention to it (Anderson, 2004).

The difference between foreground television and background television emerged as a dimension of TV attention from Anderson's work and that of others, particularly in the exploration of the effect of households where a television set is always on. Foreground television refers to active viewing by the child, or at least the presence of TV content near the child. Background television refers to the presence of TV's sound and image somewhat removed from the child's physical location. Foreground television is, if not a dominating presence, a forceful one; background television is both more remote and less attended. Older siblings as well as other adults in the household can be the source for both foreground and background TV and retain the infant in proximity to the TV. Constant TV households have long been a major concern, but Vandewater and her colleagues (2005) found that normal socio-economic status variables do not predict which households will have TV on for 12–18 hours per day. Rather, parental belief that TV is good for children or at least poses no deleterious impact predicts most accurately. Conversely, parents who believe TV can negatively affect young children tend to sharply restrict viewing.

Anderson and Levin (1976) had shown that attention to TV content rises measurably from age 1 to age 4. Younger children spent more time with toys and only 10% of the time looking at TV. Older children watched TV at least half the time and for several minutes straight. Vandewater, Bickham, Lee, Cummings, Wartella and Rideout (2005) found that about four in 10 households with children aged 1–4 had television on all or most of the time. Most children in these "constant television households" develop in the presence of foreground television which creates the developmental problems noted earlier. But others live with background television, a little studied situation. The concern turns on whether very young children tune out background television or are somehow influenced by its presence as well.

Anderson and Pempek (2005) found in an experiment among young children that they significantly reduced both the number and length of play episodes when the TV program *Jeopardy* was introduced in the background. Play episodes among 1-year olds dropped 25% in length, from an average of 80 seconds to less than 60 seconds. The results were not solely attributable to glances at the TV set, rather occurred in a setting where children seemed generally distracted. Schmidt and colleagues (2008) and Kirkorian and colleagues (2005, 2008) found in an experiment that mother-child interactions change significantly when taped TV shows are replayed. With TV on, mother-child interactions decreased an average of 21%, from 74% of the hour to 59%.

In 1997 PBS began airing *Teletubbies*, a British Broadcasting Corporation (BBC) children's program designed for toddlers. The four strongly colored characters are shaped something like snowmen with TV screens on their bellies. During the show film clips related to the show appear on the screens. Purely fanciful, the program nonetheless employs strategic repetition of words to encourage language acquisition, along with a kind of childish babble like that of toddlers. The babble or "childese" has been the source of considerable controversy in educational circles. Linebarger and Walker (2005) found that children who watched the program learned fewer new words than others. Krcmar, Grela, and Lin (2007) found that younger toddlers cannot learn from *Teletubbies* unless viewing with an adult. New words were lost amidst the multiple elements of the program, and the sequence seemed not to match normal language (Krcmar & Grela, 2004). Children over 2 years of age, seemed able to separate

new words from the other elements and to add them to their vocabularies.

How well very young children understand or process a program like *Teletubbies* was examined in an experiment by Anderson and Pempek (2005). Using regular and scrambled versions of a 10-minute segment of *Teletubbies* with children aged 6 months to 2 years of age, they found sharp age differences in attention. Up to 12 months of age, children showed no attentional differences between the two versions. At 18 months of age children showed moderate differences in attention. But, beginning at age 2, children showed clear and significant differences in attention, spending more time with the normal sequence but turning away from the scrambled version. Similar results emerged when Anderson and Pempek played two versions, one with the normal soundtrack and the other with the soundtrack played backwards, except that 18-month olds appeared to notice the difference. Thus, the period between 18 months and 2 years of age constitutes a developmental stage when children begin to recognize both the visual and sound aspects of television, or at least begin to develop expectations about the organization of images and words.

Researchers reserve some of their most pointed criticisms for video products which refer to studies of cortical development as proof that watching a particular set of tapes or CDs will trigger superior mental development through stimulating the brain. No controlled study supports the assertions of commercial claims (Golinkoff & Hirsh-Pasek, 2003). Indeed, use of such materials may induce neurological crowding and become counterproductive (Huttenlocher, 2002). In reality, very young children are much slower to imitate what they see on the screen than what they see in their environment (Barr, 2008).

*B. Age 2 to 4*

Two years of age marks a shift in a child's development and the beginning of new possibilities in the relationship between children and television. At approximately 24 months of age the dynamic brain cell process of infancy begins to slow and the child's exploration of the environment rises. In this stage television content can provide substantial educational enrichment but also negatively affect behavior. Not coincidentally, this age marks the beginning of television content aimed specifically at young children and of research by media scholars on the relationship between children and television.

The world of both children's television and research on children and television changed dramatically with the first broadcast of *Sesame Street* in 1969. Prior to *Sesame Street* television content for children, apart from Saturday cartoons, comprised mostly entertainment programs in either the *Howdy Doody Show* (1947–1960) or half hour adventure formats. In the distinctive array of children's programming developed in Chicago, *Ding Dong School* (1952–1956) set the pattern for children's educational programs by simulating a classroom (Okuda & Mulqueen, 2004). Only *Captain Kangaroo* (1955–1984) involved a conversational tone with child viewers and mixed book reading and drawing with character interaction. None of these programs involved research beyond basic Nielson audience data.

Joan Ganz Cooney's inspiration for *Sesame Street* began with an overriding educational goal: bring the children of poor urban and rural families up to the school preparedness level of their middle-class peers (Lesser & Cooney, 1974). As an educational psychologist working among special needs children in rural Georgia, Cooney discovered the potential of television as the mechanism for reaching this goal on a national scale. Thus, rather than looking for a new form of children's television, Cooney saw in television, particularly the format of TV advertising, tools by which she could shape the educational future of disadvantaged preschool children. Moreover, unlike previous children's shows, *Sesame Street* was broadcast on PBS, funded by grants from Carnegie Foundation and others rather than by commercial sponsors.

In 1968 Children's Television Workshop (CTW) embarked on television programming for children founded on research and evaluated by research, a model so radical that program producers rooted in the traditional model could not grasp the merits. Edward Palmer, the first director of research, proposed two research approaches: "formative" and "summative" from the outset (Polsky, 1974, p. 48). Formative research, in Palmer's usage, has a developmental function: it tests every aspect of a program both before and during its production. Summative research studies the effects, particularly learning gain, among children following exposure.

Palmer's approach permanently reshaped the larger research worlds in education and media with an unprecedented integration of quantitative research, television production, educational content, and child development. Both the model and the research output revolutionized the relationship between children and

television (Palmer & Fisch, 2001). Literally tens of thousands of individual research studies—large and small—have been conducted by CTW over the past 39 years. In addition, research journals abound with re-analysis and studies from scholars external to the *Sesame Street* process.

No aspect or dimension of *Sesame Street* was built on assumption; everything was scrutinized through research. The very first research studies probed the unknown aspects of young children and television. How could they be reached? Did they control TV sets? Could they change TV channels—VHF and UHF (prior to cable and remotes)? When were children watching television? Could children tell when *Sesame Street* was broadcast? And so on. The results, by the way: Children at 3 controlled stations and could change channels. They watch throughout the day, and over 1 million were watching at midnight any day of the week. Children at 3 tell time by the TV program that is on, so they learned which program preceded *Sesame Street* (Lesser & Cooney, 1974).

Developmental research comprised analysis of proposed story lines, characters, and pacing for effectiveness, followed by testing and focus groups which helped refine the final product. With so little understanding of how children between 2 and 4 years of age react to TV and grasp its content, CTW staff used developmental research to open windows into this world and to achieve educational success and to remedy boring or ineffective segments. Some studies focus on production aspects: segment length, pacing, and sequencing. Others test learning strategies and effectiveness. Every new character is studied and refined to produce the desired goal.

As the program moved into social learning, developmental research studied ways to address children's emotional states and problems. For example, one story dealt with Ernie's fear of the dark. Fear kept him awake worrying about monsters who were shown dancing around. Pilot testing showed that the portrayal frightened children, too, so that only a few were attentive to the reassuring ending (Guernsey, 2007, pp. 106–07). Similarly, a pilot test of *Elmo in Grouchland*, which began with an evil person stealing Elmo's blankie, so distressed children that many wept openly in the theater.

Perhaps the most famous example of developmental research studied how to deal with the death of actor Will Lee, who played Mr. Hooper, the proprietor of the local store. Episode #1839, "Farewell, Mr. Hooper," ran on Thanksgiving Day 1983 with a direct discussion of death as part of life and a cause of grief, and it encouraged children and parents to talk about the death of a loved one. It earned a Daytime Emmy and remains one of the most poignant and influential segments in TV history (Truglio, Lovelace, Seguí, & Scheiner, 2001, pp. 73-74).

The summative or evaluative research assessed the degree of learning gain across the widest possible array of variables, and those findings constitute a large proportion of contemporary knowledge about the educational aspect of children and television. CTW mounted hundreds of separate evaluative surveys of *Sesame Street* in day care centers, nursery schools, and samples of homes across socio-economic status variables. Testing included follow up variables such as co-viewing, especially with a parent, viewing combined with post-viewing use of specially designed story books, coloring books, and work sheets. The evaluative research continued as new follow-up materials proliferated along with stuffed characters, toys, puzzles, and games.

### *C. Learning gain*

CTW research and that of others unequivocally demonstrates that children who watch *Sesame Street* gain in their learning of language (Fisch & Truglio, 2001; Rice, 1983, 1984; Rice & Woodstall, 1988; Rice, Huston, Truglio, & Wright, 1990), particularly for the intended audience of 3- to 5-year olds. One aspect of this dramatic result is the developmental stage known as the "vocabulary explosion." Between 2 and 6 years of age children acquire an average of eight to 10 new words per day (Marchman, 1990; Pinker, 1994). Because of specialization within the brain cells, children from about 2 years of age on can acquire and use 200 new words per month. Almost simultaneously children experience a "grammar explosion" in which sentence order and word sequence begin to fall into place. Suddenly, two-word expressions blossom into more complex speech.

As *Sesame Street*'s formative research demonstrated, television helps acquisition of vocabulary most effectively when the image on the screen displays a picture for the word or the word itself, and when it is accompanied by frequent repetition. A television image that is not associated with the word causes confusion, at least in the early stages of language development (Eliot, 1999).

Another crucial aspect of *Sesame Street*'s effect on vocabulary and grammar is the presence of a source

of enrichment. Hart and Risley (1995) found that the strongest predictor of a child's language skill is the amount of time and the style of parental conversation with the children. Parents who speak more often and with a richer vocabulary had a positive effect, but more importantly, parents who asked questions and affirmed children's speech tended to raise children with greater verbal skills. In adopting this kind of communication style, *Sesame Street* spurs language development. One characteristic of impoverished families is limited vocabulary, and in this context *Sesame Street* offers vocabulary that is otherwise unavailable. *Sesame Street* also offers the same enrichment to children in middle and upper class households as well. With program design aided by formative research, *Sesame Street* built an effective language learning model.

Analysis of data from the 1993 National Household Education Survey demonstrated that children who viewed *Sesame Street* come from all demographic groups and geographic areas, except that the proportion of children watching is significantly higher in more impoverished areas (Zill, 2001, p. 125). Moreover, *Sesame Street* viewers were more likely to exhibit the following characteristics with controls for all possible intervening variables:

- Signs of emergent literacy in preschool years (strongest among the most impoverished)
- Self reading of story books in first and second grade
- Less likelihood of needing remedial reading instruction.

Disappointingly, despite much stronger learning gains from watching *Sesame Street*, children from disadvantaged and impoverished households did not reach the achievement levels of their middle and upper class peers.

Wright, Huston, Scantlin, and Kotler (2001) found in a longitudinal study that educational viewing, particularly *Sesame Street*, correlated with school readiness measures for children from low to moderate socio-economic status families. These results and review of other findings led Schmidt and Anderson (2007) to conclude:

> It is clear that *Sesame Street*, the longest running TV program with an explicitly academic curriculum, has short-term positive effects on vocabulary and school-readiness and that these have long-term positive consequences. No other curriculum-based program has been as intensively studied, but numerous evaluations and other kinds of studies have found positive effects for many other curriculum-based programs consistent with those found for *Sesame Street*. Television that is designed to teach does so, with long-term positive consequences. (p. 67)

### *D. Long term effect*

CTW initiated a series of recontact studies in which researchers examined the long term effects of *Sesame Street* among high school students. The recontact study found that "students who frequently watched *Sesame Street* as preschoolers . . . had higher grades in English, mathematics, and science; spent more time reading books outside school; perceived themselves more competent in school; placed higher value on achievement in mathematics and science; elected more advanced mathematics courses; and expressed lower levels of aggressive attitudes (Huston, Anderson, Wright, Linebarger, & Schmitt, 2001, p. 140).

The Early Window Project (Wright et al., 2001) followed 230 subjects aged 2–5 over a 3-year period with interviews, phone surveys, and viewing diaries. The study, cited in the overview, provided a significant portrait of television viewing among young children. The standardized test administered annually provided insight into development of language, pre-reading and pre-math abilities. Children who watched *Mister Rogers' Neighborhood* or *Sesame Street* and other educational shows performed significantly better than those who watched other kinds of programs.

### *E. Other programs*

In 1970 *Sesame Street* was joined on PBS by *Mr. Rogers' Neighborhood*, which actually had been airing since 1968 on the National Educational Network (NET) and moved to PBS when NET went off the air. The show began in 1962 on the Canadian Broadcasting Corporation (CBC) as *Misterrogers*, but in 1966 Fred Rogers (1928–2003) bought the rights to the show and moved it to Pittsburgh and worked on a new approach. Rogers set a distinctively intimate, dialogic, and leisurely pace, asking viewers about aspects of their lives, entertaining a visitor, and exploring community life with film clips from factories, zoos, offices, fishing boats, and the like. He then moved to another part of the set, the "Neighborhood of Make Believe" with its castle and puppets (Collins & Kimmel, 1997, Rogers, 2003). Ever gentle and sympathetic, engaged with his young viewers, Fred Rogers offered young children a program which contrasted sharply with *Sesame Street* and its curriculum based content delivered with the energy of a TV ad. The show ended in 2001.

Developing pro-social behavior in children was a major goal of *Mister Rogers' Neighborhood.* Stein and Friedrich (1972; Friedrich & Huston-Stein, 1973) used the program in a field experiment on the relationship between TV content and aggression. Children from lower class families who viewed 12 half-hour episodes over a 4-week period exhibited more pro-social and helping behavior in sharp contrast to their counterparts who showed more aggressive behavior after viewing an identical amount of Batman and Superman programming.

*Sesame Street*, designed for preschool children in the 3- to 4-year-old range, seemed increasingly out of place as the media saturation of children's households rose with the explosive growth of cable in the 1990s and a parallel growth of parental use of VHS and DVD for both babysitting and educational reasons. A CTW audience analysis in the late 1990s revealed that *Sesame Street*'s core viewers were between 2 and 3, and that children's interest in the program began dropping after 3 years of age (Guernsey, 2007, p. 121). The problem was that the media world of children and families had changed dramatically by *Sesame Street*'s 30th anniversary.

As the Zero to Six study (Rideout, Vandewater, & Wartella, 2003) demonstrated, the bedrooms of even 6-month olds held TV sets and related electronic equipment, and nearly 60% of children under 2 watch screen media in a typical day. The amount of children's programming increased, much of it cartoons and other simple entertainment or reruns, but other educational programs were developed like *Barney, Blue's Clues*, and *Dora the Explorer.*

Following up on Anderson and Lorch's (1983) research, which showed that young children pay attention to TV when they are cognitively engaged, a group of producers developed *Blue's Clues* (1996–2006) using a narrative structure with interactive content rather than the episodic structure of *Sesame Street* (Anderson 2004; Tracy, 2002). Introduced on Nickelodeon, the show became the highest rated show for preschoolers and changed the paradigm for program structure for young children. Like CTW, Nickelodeon developed a line of books and related materials for reinforcement, with great financial success.

The same year PBS, the BBC, and the CBC introduced *Arthur*, a series of 30-minute programs comprising two 11-minute stories starring an aardvark and a live segment featuring elementary school children in a class room working or learning. Books and libraries are particularly important to the episodes as part of Arthur's adventures with his family and friends. Distinctly pro-social, *Arthur* also includes material on nutrition and other health issues. A unique characteristic of *Arthur* are the parodies of other TV shows and references only adults are likely to catch.

In 2000 Nickelodeon added the animated show *Dora the Explorer* to its preschool lineup with the same story driven structure. In each episode Dora, a bi-lingual Latina, sets out on an adventure to help somebody find something. Highly pro-social and imaginative, the program equips Dora with a magic backpack and map, amiable and mischievous companions, and anthropomorphic plants and animals. In every episode Dora asks viewers to help her.

Linebarger and Walker (2005) found that children who repeatedly watched *Dora the Explorer*, *Blue's Clues*, *Clifford the Big Red Dog*, and *Arthur* were able to identify more words at 30 months than children who did not view. The other significant finding: as long as children watch, they continue to learn. Children who watched *Sesame Street* showed far less vocabulary gain.

Competition from good quality educational programs was one thing, but as CTW researchers well knew, reaching 2-3 year olds required different production elements and educational approaches than that employed to reach their original audience of 4-year olds. In 1998 PBS began broadcasting a revamped *Sesame Street*, redesigned for 2- to 4-year olds, which concludes with a 15-minute segment, *Elmo's World.* The new version is story driven and structured in response to research which showed that children want to see a story from beginning to end, rather than the episodic and segmented structure of the original *Sesame Street* (Bedford, 2001). The show remains curriculum-driven, and subsequent studies show that children who view the new format show vocabulary gain. Native English speaking children who watch *Dora the Explorer* add a modest number of Spanish words to their vocabularies, particularly at 4 years of age (Linebarger & Walker, 2005).

### *F. Special considerations: Violent content*

In studies of college students whose irrational fears originated in childhood, Cantor (2001, 1998) developed Piaget's (1952, 2000) model of cognitive growth. Children who see violent content before they can adequately process it can suffer long-term trauma which leads to irrational fears. Below the developmental stage in which children can distinguish fantasy from reality, graphic violence has long term implications. Moreover, Cantor (1998) found that the image seems

very powerful for very young children, even with children as old as 5 years of age. At that age of development, she argued, the image on a TV screen is every bit as real as the parent in the living room. They fear, for example, the Incredible Hulk because young children are intellectually unable to grasp positive motivation in characters who appear frightening until they move to the next stage of cognitive development.

Apart from graphic violence and a frightening appearance, however, lesser violent content can also have short-term and long-term impact in three ways: increased aggressive behavior, desensitization and increased tolerance, and generalized fear about personal safety (Murray, 2007, p. 194). While this applies to older children and adults, the question is how preschool children might be affected. Preschool viewing of violent content correlates with negative results among high school girls (Anderson, Huston, Schmitt, Deborah, & Wright, 2001). Early viewing of violent TV and video content seems to lead to increased aggressive behavior and subsequent negative relationships with teachers (Huesman & Eron, 1986; Singer & Singer, 1981). Anderson and colleagues (2001) also found viewing violent content to be associated with lower academic achievement in girls. Schmidt and Anderson (2007), after reviewing the literature, argued that the positive impact of educational programming relates to impulse control and reduced aggression. Violent content, on the other hand, offers an opposite model of dealing with impulses and social interactions.

In conclusion, they summarized the extant research from the past 50 years:

> There is little question but that educational television programs teach, and that this teaching has beneficial short- and long-term consequences for schooling. These consequences are due not only to academic content and skills learned from the programs, but also from the social teaching of impulse and aggression control. Most of the negative effects of television stem from entertainment programs, particularly those with violent content. (p. 77)

## 5. Video and Computer Games

Although psychologist David Grossman (1995) draws a direct line from violent video games to adolescent aggression and violence, his primary concern lies with middle school age children rather than preschoolers. Still, video and computer game use by preschool children raises an array of concerns and questions whether the games have educational or pure entertainment goals because they have become a significant part of the media environment. Commercial software and video game manufacturers offer parents an array of products which promise to enhance intelligence, teach a foreign language, or prepare a child for preschool and kindergarten. Others, like the web site One More Story (www.onemorestory.com) sell subscriptions to a set of "the highest quality children's books" from 10 publishers. With a mouse, member children can see and hear a story by clicking on the image of the cover and then turn each page. This fusion of audio, video, and print media opens up a whole new media pattern for today's very young children. Whether in the background of a very young child's media life because of an older sibling or in the foreground through direct play, video and computer games are part of the world of many toddlers.

The Zero to Six study (Rideout, Vandewater, & Wartella, 2003, p. 15) found 14% of children from 0–3 years of age have played a video game, a figure which rises to 50% among 4- to 6-year olds. In addition, 7% of children 3 and younger play video games several times each week. The attitudes of these children's parents regarding the educational value of such games varies widely: 40% say they mostly hurt; 27% believe they have no effect; and 22% believe they help children learn. As sites like One More Story increase, these figures will soon seem unrealistically small. Educational claims along with fears of negative effects bear close and careful analysis. In a review of the research, Van Evra (1998) noted a significant lacuna in the area of video and computer use among younger children.

Much of the basic research addressing this area of media with preschool children has already been discussed in the sections on audio and television. A child's fundamental developmental process dictates the timing for attention to such media and the growth curve for

recognizing visual images as distinct from real objects. An extension of that line of research addresses young children's imitation of what they see on the screen. Meltzoff (1988, 1999; Meltzoff & Prinz, 2002), who developed experimental methods for testing infants' imitation of behavior seen on videos, found that even 14-month olds can replicate what they have seen 24 hours later. Barr (2008) found that children learn much more quickly from direct observation than from video versions. As with learning language, infants learn more swiftly from human interaction than from media.

Engaging very young children in video or computer games differs little on visual and audio dimensions from standard television attention and, as described above, depends on the child's developmental level and on whether the game is in the foreground or background. The degree of participation and control sets the game experience apart from simple television viewing (Calvert, Strong & Gallagher, 2005; Calvert, Strong, Jacobs, & Conger, 2007). But, the presence of interactivity does not necessarily improve children's engagement. Revelle, Medoff, and Strommen (2001, pp. 222–23) detail the ways Children's Television Workshop researchers studied the development of games through several formative research methods, including taping children playing segments under development. The need for absolute clarity and ease of response by young children and those in kindergarten and first grade formed a central concern for the CTW research.

Cognitive development offers another perspective on the relationship between children and video or computer games. Buckleitner, editor-in-chief of *Children's Software & New Media Revue*, found in his doctoral dissertation research (2004) that when preschool children could advance in a game by trial and error they were much more engaged than when they were given constant feedback in the form of directions or praise. Being in control, that is, being able to explore on their own, seemed to motivate young children to a higher level of interaction with the game. This points to a serious issue when parents play a game with their child and provide directions and commands.

Allison Caplovitz, manager of research and development for *Blue's Clues* and a consultant on children's websites, found in her research on electronic children's books that while there is no significant difference in language development in comparison with paper books, the role of parent and child is reversed (2005). Parents control the pacing and style of reading paper books; children can read electronic story books on their own, and they prefer to control the reading as they do with their toys.

One of the more radical scholars in this area, linguistics expert James Gee (2003) argues that video games can act as learning experiences that include literacy, even for 3- and 4-year olds. Among the learning areas in addition to language, Gee includes identity, situational thinking, retelling a story, grappling with a different culture, and social structure. Not all video games qualify in his view, nor does he include video games designed with an explicit curriculum goal.

> I am mainly concerned with the sorts of video games in which the player takes on the role of a fantasy character moving through an elaborate world, solving various problems (violently or not), or in which the player builds and maintains some complex entity like an army, a city, or even a whole civilization. (p. 1)

Preschoolers on the verge of kindergarten age form the youngest range of gamers who fit into Gee's type of video game, but they are far from the only players. Younger children simply have simpler games at their fingertips, but Gee's point about cognitive development and language may apply to younger children in a more limited way. PBSKids.org has developed an electronic playground in which children can explore a variety of activities and entertainments which seem more suitable to 2- to 4-year olds. Games are designed to give children complete control. The 2006 revision of the website was designed to give preliterate children the ability to play without parental assistance. "We decided we wouldn't design any more Web sites for parents," according to Sara DeWitt, director of the interactive project (Guernsey, 2007, p. 210).

With graphic violence the issue takes a different turn. For the very young child there is no such thing as fantasy violence (Cantor, 1998). Because of their stage of cognitive development (Piaget, 1952), very young children see everything as real and cannot separate what they see on a TV screen from what happens in their own house or yard. As Cantor discovered, even college students carry irrational fears created by exposure to film or TV violence at too young an age. There is no research evidence that suggests young children's exposure to video game violence differs in any significant way from other media exposure on subsequent aggression, fears, or any other dimension. The larger problem, however, is the enormous void in research in this area.

## 6. Conclusion

Like everyone else in contemporary industrialized cultures, preschool children cannot escape from the pervasive presence of communication media. Because most cannot read, their unassisted exposure to audio sources, television, and video games exceeds their exposure to printed materials. But the evaluation of those experiences hinges on a key factor. Those who do experience books and other print resources usually do so with parents or care givers. As this review has pointed out, academic and corporate researchers often disagree about the consequences and effects of media exposure for preschool children and this context forms one of the key variables.

The benefits of reading or experiencing print-based materials seem to arise from the increased contact with the person reading: an interpersonal benefit from the communication process, nonverbally as much as verbally or visually. As they grow older young children do associate the printed page (and its images) with the encoded information that they heard read to them and can use the visual cues on the page to remember the stories or other content. The initial benefit from the interpersonal connection becomes, in some ways, amplified in their later positive experience of texts. This hints at a second key variable in understanding preschool children's interaction with media: age.

Here, the situation of the various media differs: while children use media unaided, they may not benefit as much. But, here too we find exceptions. Audio stimulation, for example and typically, works best in interpersonal settings. Infants learn language better through interaction than through media sources. Music, which does not require human mediation, has immediate effect, without interpersonal presence. The key variable, volume, makes a difference in both music and language for young children. These observations, of course, change with age. Older preschool children do not seem as sensitive to volume; in addition, they do benefit from simple audio and video content. But parental (or other adult) engagement still matters and remains an important component in a child's learning.

And, again as this review has shown, researchers do not agree, particularly in the cases of television and video games. Some find these a helpful resource for young children and others absolutely oppose them. The variables of age and interpersonal interaction seem relevant here as well. One final difference in evaluating young people's interaction with television has little to do with the medium itself and more with the larger cultural context. We understand much more about children's experiences with television because the research community and the commercial community have devoted huge resources to understanding them. The CTW model of formative and summative research has identified many valuable lessons and variables. But these research communities disagree, not only because of their initial starting points or desires to aid or protect children. Many times they study very different children: the very young or the school-age child. The focus leads to quite different results.

Video games introduce even more uncertainty and potential for disagreement. They highlight the new world of children and media. Though designed for older children, they present themselves easily to younger ones; though envisioned as shared opportunities for younger children, they foster solitary use, as children prefer to manage their own interactions. In short, video games confound the two key variables of interpersonal interaction and age. And, as relative newcomers to the communication world of children and media, video games have a much thinner collection of research. We know something about them and we can infer more, based on knowledge of children's television for example, but we may not even know the extent to which our knowledge tranfers to this related format.

As always, much still remains for communication researchers to learn. This review has pointed out the beginnings of the study of very young children and the media. Neonates to 18-month olds differ dramatically from 2- to 4-year olds and again from older children. But all encounter communication media, more so today than even 10 years ago. With more and more communication opportunities in print, audio, television, and video games, we find more and more to understand about how children (and adults) interact with the media and with each other. It's an exciting world for communication researchers, but one that may well prove baffling for parents and teachers—at least in the near future.

# Afterword

In our highly commercialized, media-saturated modern culture, Dr. Thorn's review of the literature on preschool children and the media reminds us that the primary "job" of young children is developing cognitive and social capabilities, and *not* becoming socialized as consumers in a capitalist marketplace. Looked at in the context of a media culture that defines even the youngest children as a "market," the research literature brings us back to a more humanistic and child-centric focus. Indeed, at a time when the media environment for children is rapidly changing, examining the role of these technologies and messages in the growth and development of children should lead the discussions of how, when, and *why* to expose young children to media.

The literature on how and what young children learn from media suggests important directions for future content developers, policy makers, parents and caregivers, but the research needs to be contextualized in the broader media environment to be useful as we move into the future. In particular, I want to highlight four trends in children's media culture that should guide future research and help us to rethink the applications of prior research:

First, *digital convergence* essentially removes the distinction between different media as content created for television can be viewed on a TV, a computer, an iPod, or a cell phone. Audio and even print media are available online. This changing media ecology has implications for research that looks at the unique characteristics of individual media. While many adults make the distinction between channels of distribution, most children and adolescents do not. They're growing up in a world of media convergence and engaging with media differently from previous generations. Most young parents are *multi-taskers*, comfortably using multiple media simultaneously and fully integrating electronic media into their lives. And their children learn by example. Multi-tasking increases the number of simultaneous media inputs and should be examined in the context of young children's developing language acquisition and attentional abilities. As well, convergence leads to new questions about how content designed for exhibition on a 30- inch screen is received on a two-inch screen or a 60-inch screen (with surround-sound).

New media are *personal and portable*, allowing users to be exposed anywhere at any time under any circumstances. Laptop computers, portable DVD players, ipods, cell phones, and handheld video game players all rival books as the portable medium of choice for children. And the content is customized: children have their selected songs downloaded on their ipod; their DVD library for long car trips; their video games to play on their Nintendo DS; and their favorite Internet sites bookmarked on their laptops. This has implications for research addressing the role of social context in children's media use. While the evidence is clear that interpersonal interaction enhances learning among infants and toddlers, the new media discourage interaction by making media use a personal experience. Even though computers and TV/video/DVDs can be "interactive," the type of interaction provided by these technologies does not include key tactile or olfactory experiences. And key social skills acquired through negotiating for media use are not tapped when children (and parents) each have their own personal media. Car trips, long waits in doctor's offices, etc. are much quieter when everyone is plugged into his/her own portable media, but we have to ask what is being lost in babies' development?

Children's products are created to be *multi-platform* "supersystems" (to borrow a descriptor from Kinder, 1991). Gone are the days of stand-alone toys and television programs. Media conglomerates target children with the same content across television, video/DVD, audio, software and online content, print media, and toys. This has implications for the research addressing the variety of content choices available to children. If babies' brains develop according to the environmental stimuli present, then more varied and complex environments should encourage a different kind of brain development than an environment saturated with relatively similar inputs. Although *Sesame Street* and *Blue's Clues* programs and ancillary products have substantial research to show their educational power, saturating babies' environments with these images and stories is still limiting. The impact of toy-TV/DVD tie-ins on young children's developing capacities for imaginative play is an area in need of further research.

Finally, the highly *commercialized* nature of children's culture must be acknowledged, as even the

youngest children are targeted as a "market" for media products. Lapware (software for babies designed to be used on a parent's lap), baby DVDs, and even 24/7 baby-targeted cable channels like BabyFirst TV play on parents' concerns about the educational achievement of their offspring. While this content does not contain advertisements, it does normalize the practice of babies' consuming media. Once babies are defined as an acceptable market for media products, then how can we question the targeting of preschool- aged children? And young children are not only targeted for program consumption, but they are the targets for advertising and marketing campaigns featuring favorite program characters selling a variety of consumer goods. The current epidemic of childhood obesity in the United States has led many in the public health field to question the role of food marketing to children and its impact on children's food choices. Commercial breaks during children's programs are filled with attractive messages featuring popular, recognizable characters selling high-fat, high sugar, low nutrient foods (Gantz, Schwartz, Angelini, & Rideout, 2007). There is no shortage of evidence in the research literature indicating that children under age 8 are more susceptible to persuasion than older children, yet the practice of advertising to this age group is prevalent. Given the evidence that environmental inputs influence cognitive processes, more research is needed to see whether increased exposure to persuasive messages accelerates children's abilities to comprehend these messages or whether we are creating a culture of consuming kids.

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## Book Reviews

**Cooper, Stephen D**. *Watching the Watchdog: Bloggers and the Fifth Estate*. Spokane, WA: Marquette Books, LLC, 2006. Pp. 355. ISBN 0-922993-46-7 (hbk.) $59.95; ISBN 0-922993-47-5 (pb.) $39.95.

While it's not exactly news in 2008 that there's a new sheriff in Media Town, Stephen D. Cooper's *Watching the Watchdog* provides a sturdy, well-researched account of some early forays by an emergent posse of digital deputies.

Cooper takes a deep and serious look at what critics have occasionally dismissed, sometimes to their peril, as a lightweight, populist phenomenon that has come to be known as the "blogosphere."

In fact, Cooper, an associate professor of communication at Marshall University with a doctorate from Rutgers, goes so far as to argue that blogs and bloggers constitute "a legitimate social institution," a spontaneously arising, self-organizing, self-regulating Fifth Estate—in effect a watchdog for our traditional watchdog, the press, or Fourth Estate.

Cooper sections the activities of this new media form into a quadripartite typology that he uses to interpret and analyze how its practitioners patrol the airwaves, pages and Web sites of mainstream journalism:

- accuracy (checking the veracity of news reports)
- framing (how facts and events are interpreted or presented by journalists)
- agenda setting/gatekeeping (how issues and events become newsworthy, or not)
- journalistic practices (the methods journalists and news outlets use).

In 355 pages written in the stiff prose of the academy and laden with extended excerpts from a number of online postings and other source materials, Cooper examines how a diverse, informal, digital vox populi is increasingly monitoring—and holding to account—the press, an institution that once held itself the last word in safeguarding the public interest and ensuring accountability.

Perhaps the most celebrated case Cooper cites was the 2004 online uprising sparked by Dan Rather's use of documents of questionable provenance to cast a pall over President George W. Bush's service in the National Guard three decades earlier—a report that aired on CBS at the height of Bush's wartime re-election campaign.

Rather's "60 Minutes II" report was quickly challenged by bloggers who had downloaded the documents that CBS so helpfully posted on its own Web site. The resulting blogger analyses of typefaces, timelines, and military argot of the period prodded mainstream outlets into examining the controversy and ultimately led CBS to repudiate the report and ease Rather out of his CBS anchor chair ahead of schedule.

More importantly, the episode put journalists everywhere on notice that the so-called "voice of God" era of 20th century journalism was over. No longer could the audience be regarded as just a passive, pliant maw for received wisdom dispensed by a media culture operating according to its own inscrutable conventions and intentions.

Rather, the audience was now empowered with a global platform to challenge journalists directly (via e-mail or comment sections on news outlets' own Web sites) or indirectly (but no less effectively) by communicating with each other publicly via blogs in the digital echo chamber that constitutes the "blogosphere."